Atmospheric and Environmental Research, Inc.

Data Analysis for A Better Understanding of the Weekday/Weekend O_3 and PM Differences

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"Weekend Effect" Research Workgroup Meeting
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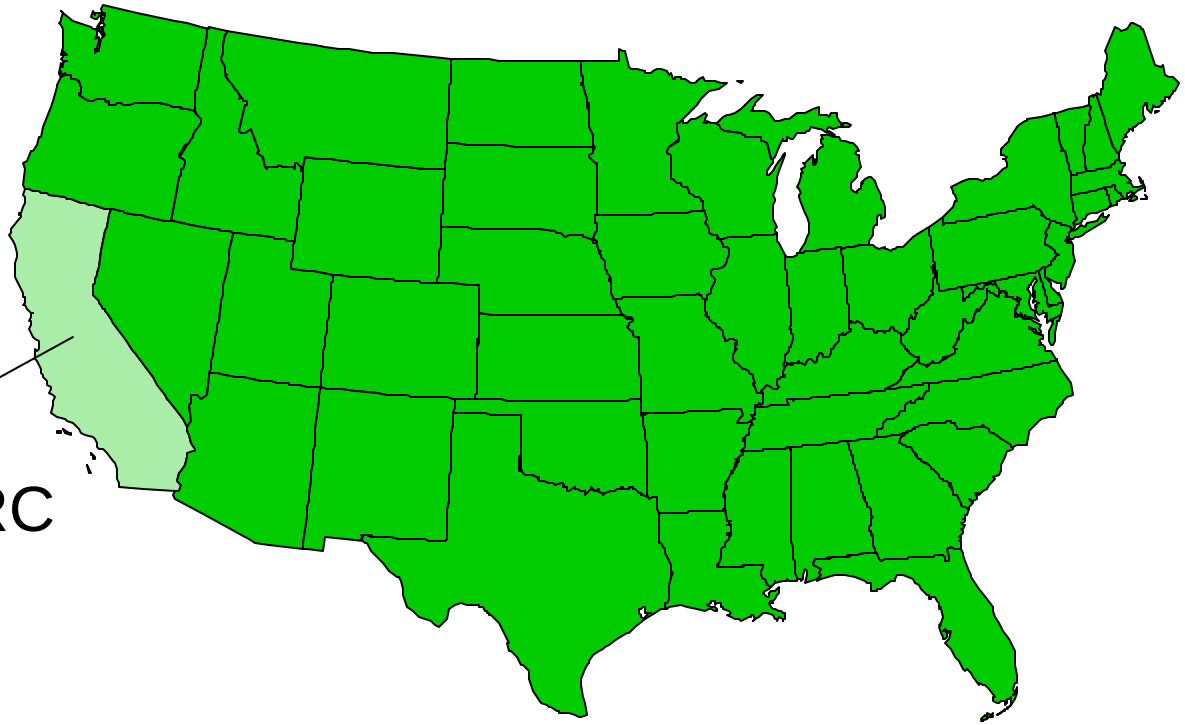
Introduction



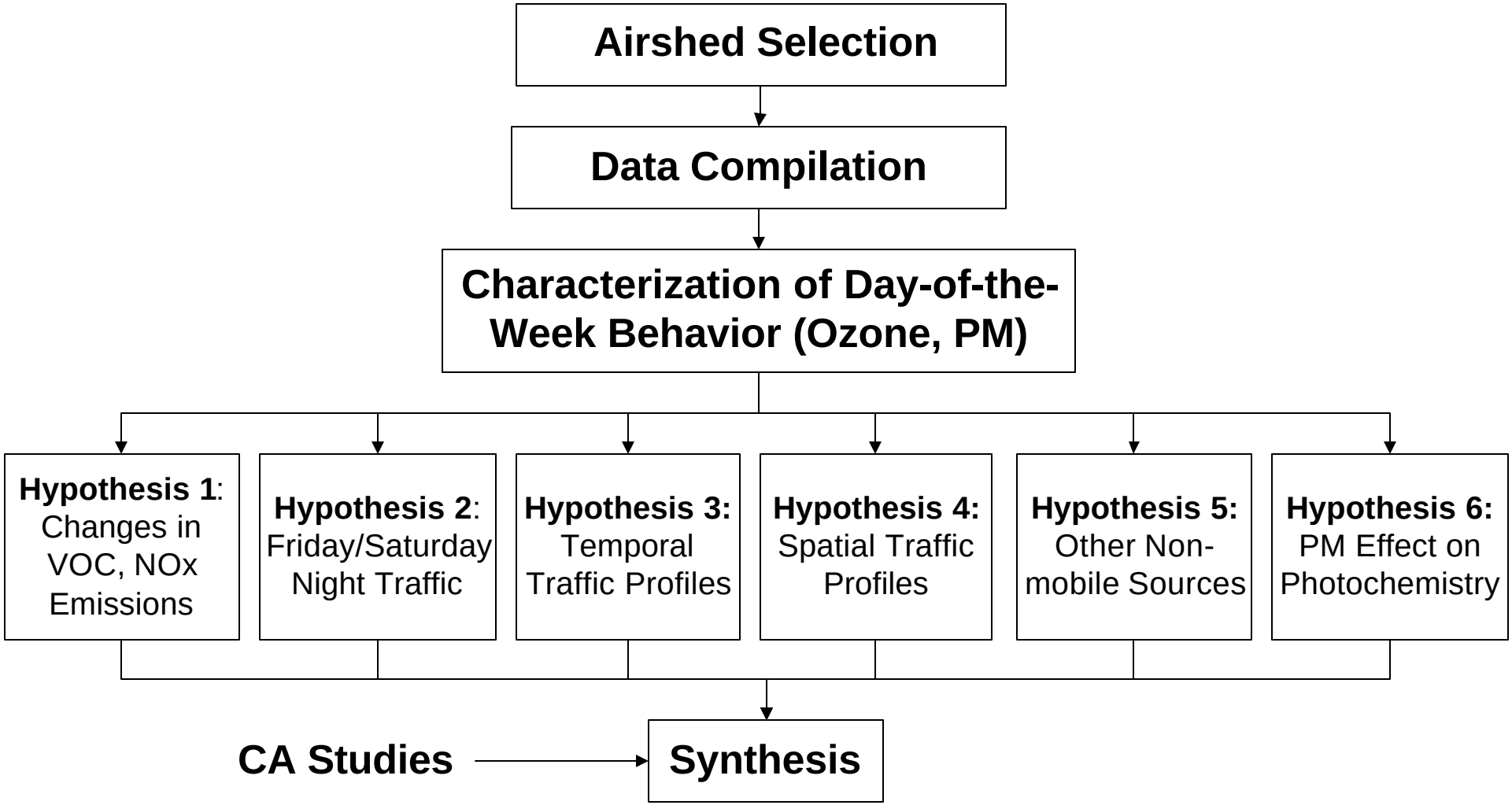
CARB, NREL, CRC
- Data analysis
- Modeling
- Field study

CRC Project A-36B is a data analysis project to study weekday/weekend differences in O_3 and PM in areas outside CA

Objectives

- At 3 urban locations outside CA, study the day-of-the-week dependence of
  - diurnal profile of hourly O_3 concentrations
  - daily maximum 1-hour and 8-hour O_3
  - PM_{10} and $PM_{2.5}$
- Test hypotheses for the “weekend effect”
- Identify changes in the weekday/weekend difference over a longer period

Technical Approach

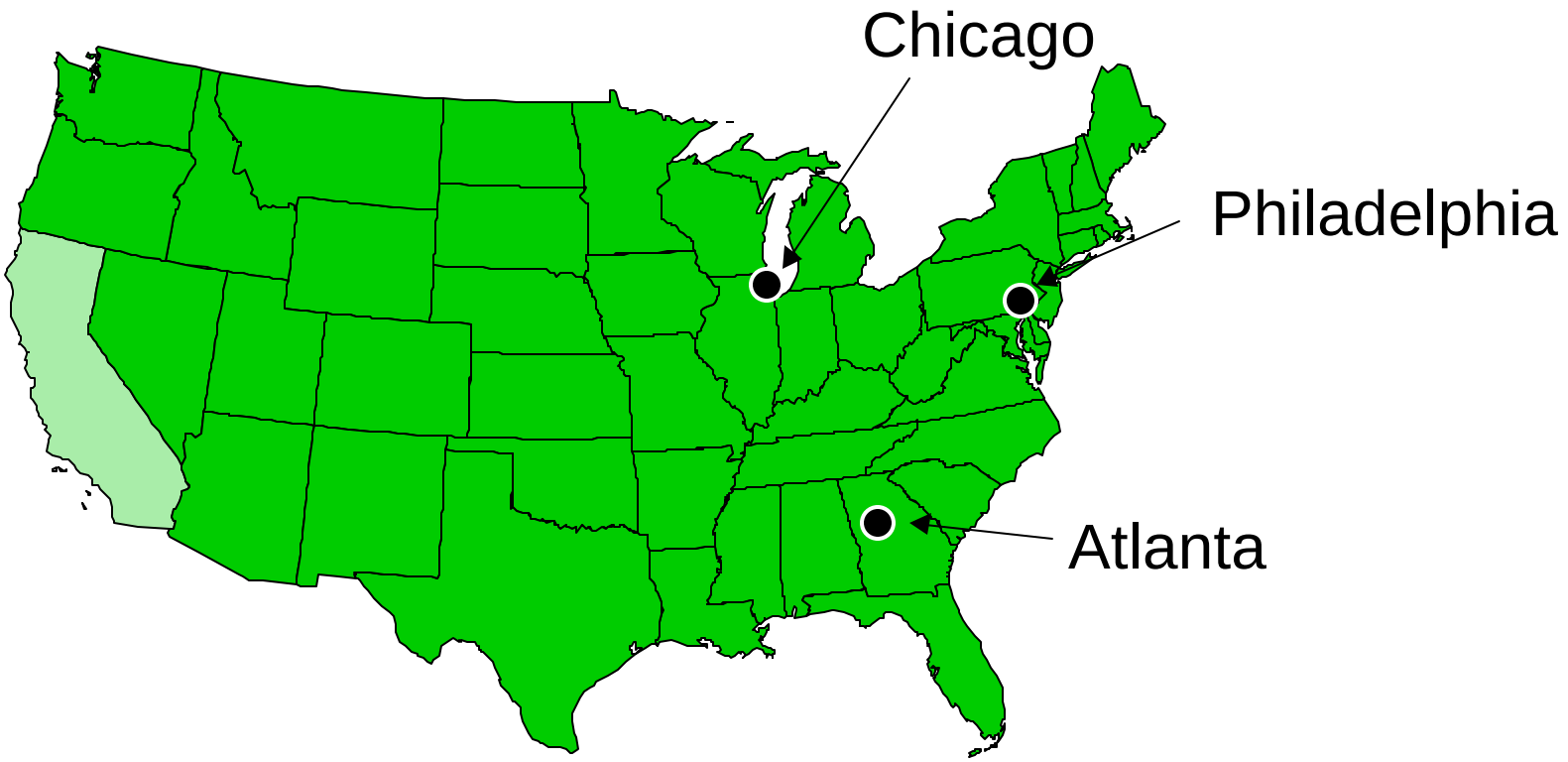


Selection of Airsheds

Region	O_3 non-attainment	PAMS	Air quality studies	
			O_3	PM
Atlanta, GA	Serious	4	SOS*	ARIES
Philadelphia, PA	Severe	5	NARSTO*	MAACS
Houston, TX	Severe	6	COAST*	TSPMP
Lake Michigan, MI, IL, WI	Severe	8	LMOS*	--
Nashville, TN	Moderate	0	SOS*	MAACS

* Data base available for 3-D air quality modeling

Selected Sites



Hypothesis Testing

1. Changes in emissions of NO_x and VOC
   - Hourly NO_x, VOC, VOC/NO_x from SLAMS/NAMS
   - Photochemical indicators from PAMS and special field studies
2. Increased carryover due to Friday and Saturday night traffic
   - Hourly CO, NO_x from SLAMS/NAMS

Hypothesis Testing (Continued)

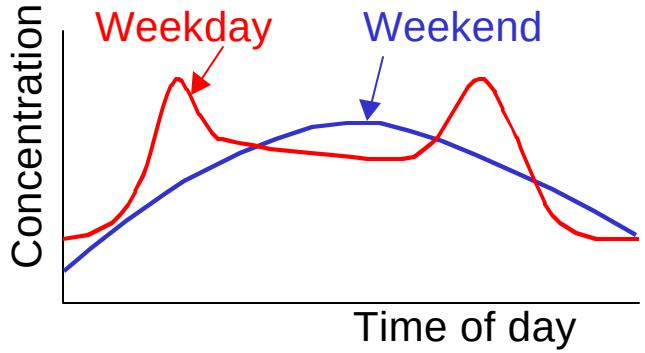
3. Changes in traffic patterns: temporal
   - Hourly CO, NO_x, VOC, and NO_x/VOC
   - Composition of VOC mixture from PAMS
4. Changes in traffic patterns: spatial
   - CO, NO_x, and VOC at several metropolitan monitors
   - Maps to display patterns

Hypothesis Testing (Continued)

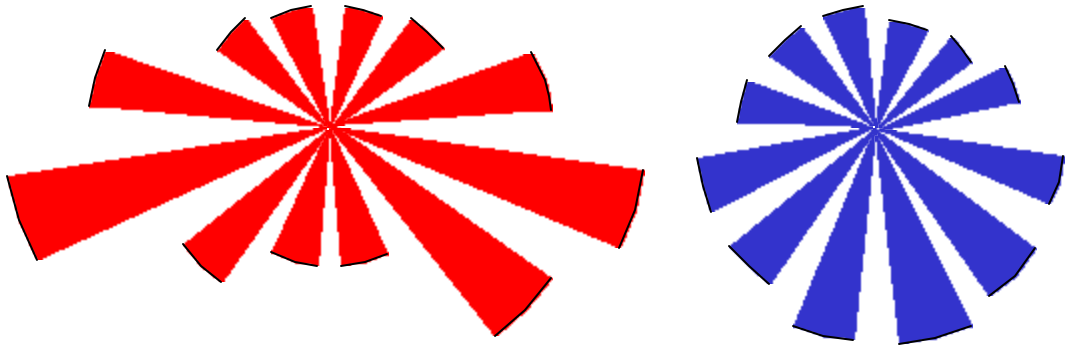
5. Sources other than on-road mobile sources
   - Speciated VOC and PM data from PAMS and IMPROVE
   - Marker species
6. Changes in PM emissions affect light extinction and photochemistry
   - Solar/UV radiation and PM from NAMS/SLAMS, PAMS, and IMPROVE
   - Visibility from NOAA data base

Data Analyses

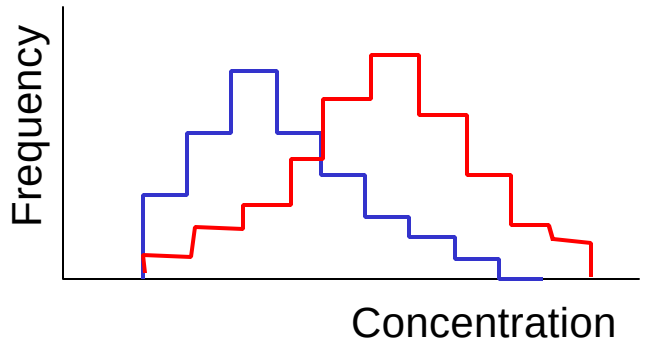
- Hour-of-the-week
  - e.g., mean, median



- Clock plots

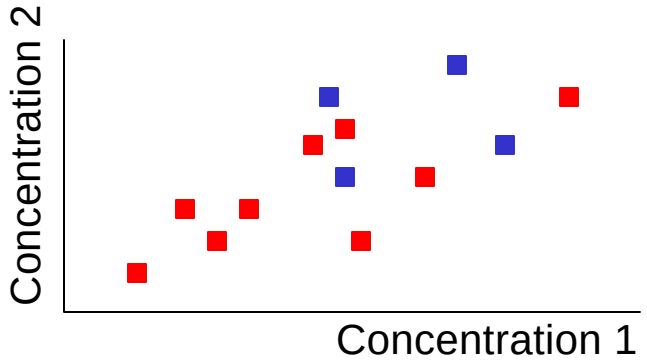


- Frequency distribution



Data Analyses (Continued)

- Correlations
  - e.g., visibility vs. $PM_{2.5}$



- Seasonality
  - Same as above by season

- Statistical significance
  - Bootstrap sampling

Project Team

- AER
  - Project manager: Christian Seigneur
  - Betty Pun, Kristen Lohman, Yang Zhang
- Warren White